CECO Adwest

October 19, 2020

Budgetary proposal not for sale

Attention: Mock budgetary proposal for two 60,000 cfm RTO with scrubbers

Reference: Request for budgetary price for Automotive Meg Shredder RTO & Scrubber

Adwest Technologies, Inc. is pleased to attached our budgetary proposal.

We equip the system with a Maxon Kinedizer LE Low NOx Burners , 10" Color HMI Display in base units and flameless operation for virtually zero NOx in comparison to operate with burner always on. The RTO to Scrubber duct is typically built with a specialty alloy. Design and performance of the abatement system is based on Adwest's previously supplied RETOX RTO systems for similar mega shredder facilities with the RETOX RTO design of specialty alloy construction. **NOTE: Due to Alloy Steel prices volatility, Adwest will advise any steel alloy increases at the time of order for the attached pricing in this proposal. The quicker we receive your purchase order, the quicker we can lock into the alloy and steel prices for the RTO thermal oxidizers.**

We have also provided pricing for a scrubber/quencher manufactured by HEE-Duall, a CECO Environmental company.

The RETOX RTOs and scrubbers quoted in this proposal are designed to **destroy 99%** of volatile organic compounds (VOC's) and provide a **97% primary heat recovery** at full flow effectiveness which provides fuel free operation with our energy saving flameless **NOx Free Natural Gas Injection (NGI)** operation.

Each RETOX RTO module is shop-assembled on a compact skid which minimizes field assembly and installation costs and time. The system uses an energy saving forced draft fan design with fans, motors and drives by others as requested. An integral CompactLogix Allen Bradley PLC control system with VPN Ethernet telemetry features provides automatic system operation and free lifetime diagnostic service support by Adwest.

Our RETOX RTO oxidizer systems have been successfully installed on over 1,200 VOC control applications since 1988 with such clients as S A Recycling Mega Shredders, Safety Kleen, EQ Recycling, Rollins Recycling, Eastman Chemicals, Dupont and ALCOA.
In summary, our RETOX dual chamber regenerative thermal oxidizers provide a market proven, reliable and low maintenance solution to Mega Shredder VOC abatement including:

- Fuel Savings Over 30% - With Natural Gas Injection (NGI)
- Flameless **RETOX No Nitrogen Oxide (NOx) NGI Operation**
- **Low NOx Maxon Kinedizer LE burners have been added as requested**
- **Simple, Zero Leakage RTO Poppet Valve Flow Control with/Five (5) Year Warranty**
- **Low Pressure Drop/Low Cost -** Turbulent Flow - random Ceramic HX Media

4222 E. LA PALMA AVE ANAHEIM, CA 92807 TEL: (714) 632-9801- FAX: (714) 632-9812
www.CECOenviro.com/Adwest

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- **Rapid 90 Minute Hour Cold Startup Capability** (20-25 Minute Warm Start)
- **Skid Mounted, Low Profile RTO Design -** For outdoor platform Installation
- **Proven Allen Bradley, Maxon, Siemens, and Honeywell Components**
- **24/7 RTO Technical Service Support -** With Lifetime Telemetry VPN Diagnostics

ADWEST TECHNOLOGIES, INC.

ANAHEIM, CALIFORNIA

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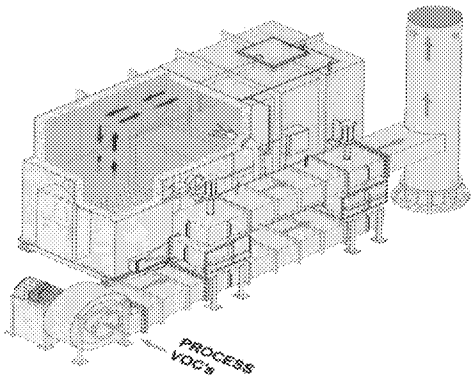
RETOX
REGENERATIVE THERMAL OXIDIZER SYSTEM (RTO)



PROPOSAL FOR

120,000 SCFM (2 RTOs x 60,000 SCFM with 2 Scrubbers)

OUR REFERENCE: PROPOSAL NO. 20-1ALBudgetary

CALIFORNIA STATE CONTRACTORS
LICENSE NO. 1061685

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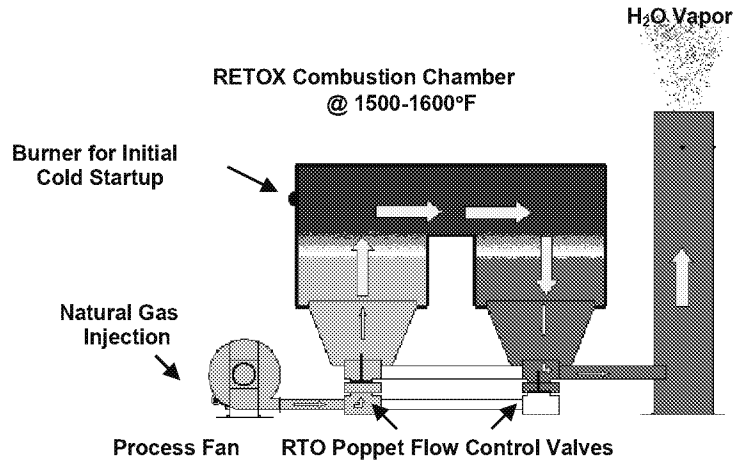
RETOX RTO SYSTEM GENERAL DESCRIPTION

INTRODUCTION

The RETOX RTO System provides a proven and cost effective way for volatile organic compounds (VOC's) and VOC-laden gas to be converted into carbon dioxide and water vapor.



EQUIPMENT

The RETOX RTO system consists of a reinforced, insulated dual chamber filled with low pressure drop ceramic heat exchanger media. The process gas flow is automatically controlled by a zero leakage poppet valve mechanism, which changes the direction of the gas flow at regular intervals via an integral programmable logic control (PLC) system. An external burner is used only for a rapid initial cold startup, typically 80 minutes. Only one RETOX fan is needed for normal RTO operation (i.e. No purge or Combustion air blowers).

PROCESS COMBUSTION

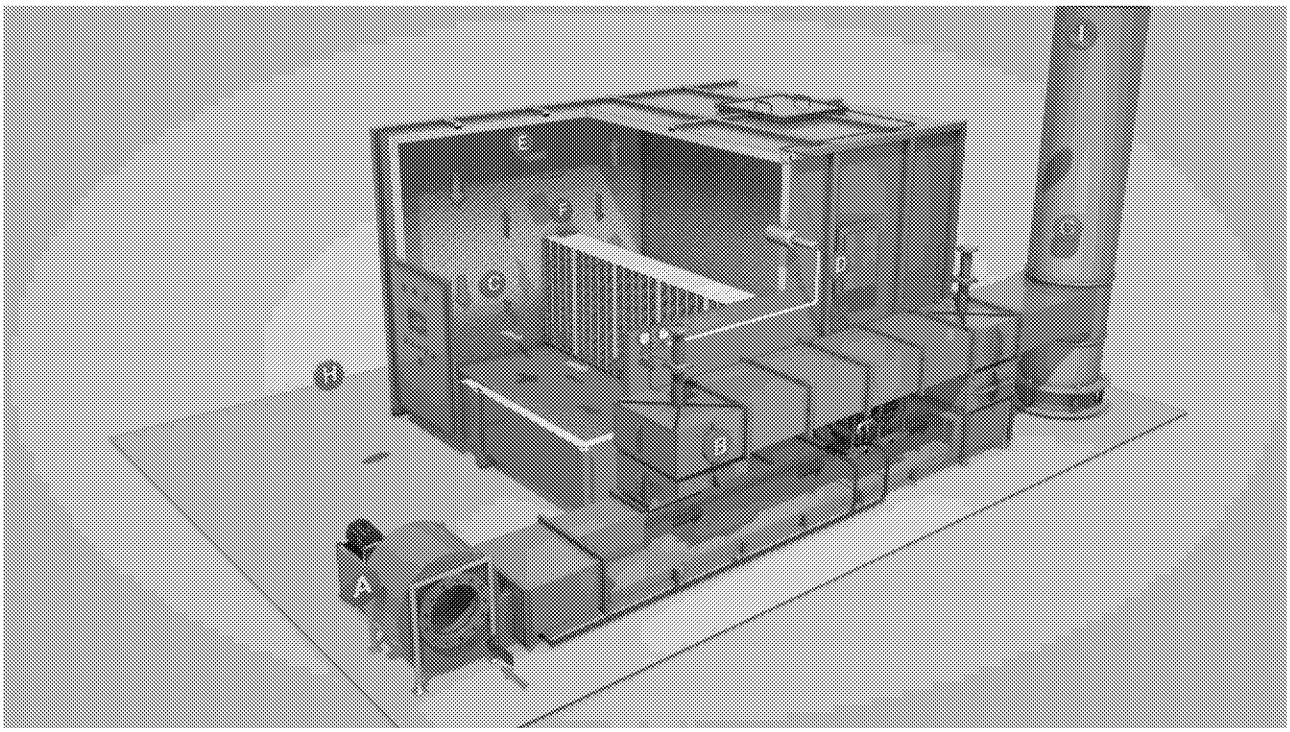
Due to the abundant oxygen content of the process gas, complete combustion readily occurs when the ignition point is reached in the oxidizer (typically 1500-1600°F). Process hydrocarbons are converted to carbon dioxide and water vapor. With a sufficient concentration of VOCs in the incoming process gas, the exothermic of the VOCs will be enough so that the destruction of VOC's will be self-sustaining and no auxiliary heat energy is required from the fuel source.

HEAT RECOVERY

The high level of up to 97% heat recovery at full flow achieved is the result of regenerative heat transfer. The VOC laden process air enters a porous bed filled with high temperature, low-pressure drop turbulent flow ceramic heat transfer media. The air is preheated by bed #1 to a maximum temperature, passes through a central combustion chamber where the hydrocarbons are oxidized to carbon dioxide and water vapor, and then exits a second bed where heat is transferred from the hot air back into the bed. To avoid an uneven temperature distribution in the RTO, the gas flow direction is changed automatically at regular intervals by the poppet valve flow control mechanism to maintain even temperature profiles between the dual ceramic media chambers.

ADWEST TECHNOLOGIES CUSTOMER SERVICE

Adwest provides 24/7/365 responsive technical customer service for both our RETOX RTO systems, as well as competitive RTO oxidizer units. Our oxidizer service group has nine regional service technicians located throughout the USA. Our RTO specific service technicians average 17+ years RTO oxidizer experience. Call Adwest's responsive customer service group at (714) 632-9801 to schedule your preventative maintenance visit today.



EQUIPMENT PRICING-2 RETOX RTOS AND SCRUBBERS W INTEGRAL QUENCHERS

Total price for the supply and installation of two (2) RETOX 60.0RTO97 regenerative thermal oxidizers with 97% Primary heat recovery and 99% VOC DRE and 2 Scrubbers with integral quenchers as delineated in the attached engineering specification.

Description	Unit Price	#	Extended Price OPTION 2
A-1: RETOX **60.0RTO97** (2205 Alloy) with 10" COLOR HMI	US$ 1,500,000	2	US$ 2,900,000
A-2: Installation Supervision (Excluding Startup and Training)	US$ 24,000	1	US$ 24,000
A-3: OE Factory Certified Start-Up & Operator Training	US$ 20,000	2	US$ 39,000
A-4: Five (5) Year RTO Poppet Valve Flow Control Warranty (Requires ADWEST Annual PM Visit)	US$ *No Charge*	2	US$ *No Charge*
A-5: Flameless NGI NOx -free operation & energy savings	US$ *No Charge*	2	US$ *No Charge*
A-6: OE Factory Pre-Wired / Tested RTO design	US$ *No Charge*	2	US$ *No Charge*
A-7 (a): Acid Gas Vertical Scrubber with integral quencher by Monroe Environmental	US$ 600,000	2	US$ 1,200,000
A-8: RETOX RTO, QUENCH, Scrubber Mechanical Installation, depending on site visit and clarity of scope.	US$ 110,000	2	US$ 220,000
TOTAL			**US$ 4,383,000**
OPTIONS			
B2: RETOX RTO & Scrubber Spares List	US$ Per List		
B3: Additional Adwest Start-up Services-per diem Plus expenses	$1,280/day		

Term of Sale:	**Ex- Works (EXW) United States – Pre-Pay and Add *(+10% Handling)***	
Payment Terms:	30/30/30/10	Due Upon Receipt of Invoice Due Upon Receipt of Invoice Due Upon Receipt of Invoice
Shipment:	**Drawings** 2 - 3 weeks after approval of Purchase Order and deposit **RTO Fabrication** RTO Fab is 24 - 30 weeks after approval of RETOX RTO fab drawings with release for fabrication as Alloy mill run of alloy is 12-13 weeks to secure materials. **Scrubber Fabrication** Scrubber fab is expected to be 18-25 weeks after final GAD approval of HEE-Dual GADS by client with release for fabrication	

Should Customer delay approvals of Drawings (Over 2 weeks from Submittals) or acceptance of Equipment or Start-up (2 weeks from Notification), any respective amounts still outstanding become immediately due, Customer will be invoiced accordingly and expressly agrees to pay in full.

PURCHASE ORDERS: To insure proper and timely processing, a purchase order resulting from this proposal should **reference this proposal number** and be issued to:

Adwest Technologies LLC, 4222 East La Palma Ave, Anaheim CA92807

SCHEDULE

Our shipment is subject to confirmation at time of approval of drawings by Customer. Adwest Technologies, Inc. will work with you to coordinate the RETOX shipment schedule to meet your VOC control compliance schedule to the best of our abilities. Actual freight costs (Pre-Pay & ADD) will be invoiced at time of delivery plus 10% handling.

CONDITIONS OF SALE

Notwithstanding any other paragraph contained in this entire proposal, our Conditions of Sale, for the equipment shall be incorporated herein and shall be applicable. All quoted prices based on current costs are firm only if shipment is made within six-months from date of quotation.

PRICE ADJUSTMENT

Due to the volatility in the metals marketplace we reserve the right to modify our price after the proposal expiration date and until the order for the equipment identified herein is accepted by Adwest. Our quote is based on the following reference price for the alloy steel for this project:

- Our quote is based on the price of $2.86/lb (mill price plus surcharges).

Any adjustments, increase or decrease, will be the differential in pricing (material cost plus surcharges) of the alloy material from the base cost to the cost at the time of order acceptance.

CANCELLATION FEES

In cases of cancellation of any order after said order has been acknowledged, the following schedule applies:

AFTER PURCHASE ORDER BUT PRIOR TO DRAWINGS SUBMITTAL	25%
AFTER DRAWING SUBMITTAL	40%
AFTER DRAWING APPROVAL AND PRIOR TO RECEIPT OF BUYOUTS	50%
AFTER DRAWING APPROVAL AND RECEIPT OF BUYOUTS	75%
AFTER FABRICATION BEGINS	85%-95%
AT COMPLETION OF FABRICATION	100%

Customer expressly agrees these amounts will become due and will be paid forthwith.

CONTRACT ON CANCELLATION

In the event of termination by Buyer, if Seller, at the time of such termination, shall have in stock or on firm order any completed or uncompleted items or any raw, semi-processed or completed materials for use in fulfilling this Agreement, Buyer may require Seller to deliver all or part of the completed or uncompleted items or any raw, semi-processed or completed materials to Buyer. If such requirement is executed and value of materials exceeds the Cancellation Fees as above, Buyer will adjust reimbursement to Seller accordingly.

POLICY OF CONTINUING QUALITY INNOVATION

In the interest of maintaining state of the art quality in our equipment, Adwest Technologies, Inc. reserves the right to revise these specifications and incorporate suggested changes to include the latest improvements in the equipment design vendor components and system hardware.

PROCEDURE AND INSURANCE REQUIREMENTS

Provisions must be made by Purchaser to ensure that condensation of the fumes and vapors does not occur on the ducting or heat transfer surfaces during the operation of this equipment. Should deposits of this nature take place, such that a potential of fire exists during running, upset or shutdown conditions, it will be necessary to install a fire extinguishing system to protect this equipment from damage. This system must be designed so that the extinguishing materials will not be allowed to enter the oxidizer, as damage to the equipment could result. These provisions are not included in this proposal.

The equipment selected will incorporate automatic features for protection and safety. However, while these features and their characteristics of operation afford a degree of safety, operation of the equipment is not to be considered free from all dangers and hazards inherent in the handling and firing of fuel. Proper operating techniques and maintenance procedures as specified in our manuals must be adhered to at all times.

NFPA 86 2011 Edition, Chapter 11 requires that the process exhaust be monitored for LEL (Lower Explosive Limit) if the LEL has the possibility to exceed 25%. Adwest strongly recommends LEL monitoring and in fact, it is required for streams over 25% LEL. We have not included the cost for LEL monitoring in this proposal but would be happy to quote this as an option if desired.

Should the obtaining of FM approval require special equipment not covered in this specification (i.e. fire protection equipment, electrical interlocking of the oxidizer to the system), the cost of this equipment and obtaining of all permits or approvals required for installation and/or operation of this equipment is the responsibility of others.

ERECTION ASSISTANCE AND START-UP

Any contract resulting from this proposal will require start-up by an Adwest Service Technician to validate our warranty and guarantees. This will require a technical service representative to be present at the time of initial start-up and must give release of operation of the equipment in accordance with the Seller's operating and maintenance manual.

STARTUP AND TRAINING – Startup and Training Services for standard weekly non premium time are Included in the (A-3) Portion of this Proposal

- Startup and Training to Take Place During 1st Shift, Monday-Friday
- Overtime, Weekend, and Holiday Hours will be Billed at Additional Cost. Travel and Living Expenses are Included. A Minimum 2 Week Notice is Required Prior to the Scheduled Startup Date for proper manpower scheduling.

SAFETY INSPECTIONS AND TESTING

RTO's are dependable and will provide reliable service for many years. In fact, users often forget it's part of their process as they operate with little attention for long periods. However this is only possible with routine maintenance and the National Fire Protection Association states that "documented safety inspections and testing shall be performed at least annually". (NFPA 86 Standard for Thermal Oxidizers 2011 Edition Chapter 10). Adwest will be able to give you this service by supplemental agreement. Please contact our office for further details.

DESIGN CRITERIA (Each RETOX RTO Thermal Oxidizer)

The design criteria is for your Mega Shredder VOCs emissions as supplied by Woodard & Curran and Schnitzer Steel as follows:

	2-RETOX 60.0 RTO97
Process Volume, (SCFM)	60,000 x 2 RTOS
Process Gas Inlet Temp., °F	105
VOC Loading #/Hr.	200
VOC Composition	Mixed Hydrocarbons-See below
Negative Pressure Upstream of oxidizer, ("w.c.)	-6.0

Jobsite: Somewhere in California

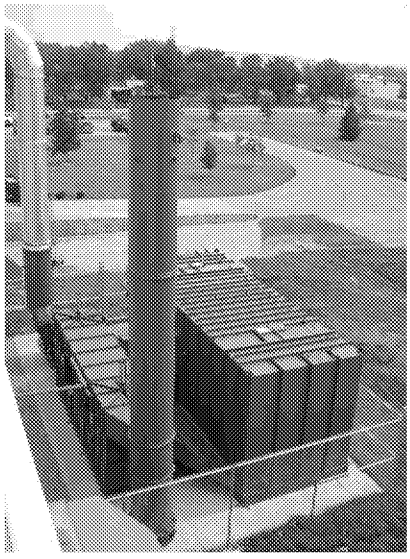
The VOC composition tabulated above has been assumed to have a VOC heat of combustion of 10,000 BTU/# net. (See table below for process gas compositions provided by client)

If low boiling hydrocarbons, condensables, **particulates** or **silicones** are present in the process stream such that the potential for condensation or plugging in the duct or media exists, these conditions should be reviewed by Adwest Technologies engineering.

Controlled Emissions: (Table is intended as an "example list" of organics, acid gases, metal compounds present and not an exhaustive list, concentrations shown are approximate only)

Pollutants	Units	Value	Pollutant	Units	Value
TBD					

NOTE: ***Adwest highly recommends the upfront purchase of a specific Spare Parts package for your RETOX RTO and scrubber system, which can decrease potential oxidizer down times from three days to three hours, or less. Contact Adwest for Spare Parts list and current price.***




MEGA SHREDDER APPLICATION
ADWEST RTO and ACID GAS SCRUBBER
40,000 SCFM

PERFORMANCE GUARANTEE

1.A We make the following Performance Guarantee: If all of the Performance Conditions are satisfied (See Page 7 "Design Criteria"), then the Equipment will reduce the concentration of hydrocarbons measured at the discharge stack of the Equipment as compared to the concentration of hydrocarbons measured at the inlet of Equipment by an average of 99% or down to 25 ppm as C_1 in the stack. The Performance Conditions are defined in this specification under the heading of "Design Criteria". The Equipment must be operated within minimum design limits of 1500°F to 1600°F oxidation temperature. 1500°F minimum should be specified for air quality permitting purposes.

1.B Nitrogen Oxides-We make the following NO_x Performance Guarantee: If all of the Performance Conditions are satisfied and the equipment is operated within design parameters as specified in the "Design Criteria" section, the equipment will perform such that the total concentration of NO_x as measured (i.e. uncorrected to 3% of oxygen) at the discharge stack will not exceed 2 PPMv. This guarantee is predicated upon an inlet NO_x concentration of 0 PPMv and no nitrogenated hydrocarbons or compounds including ammonia in the process exhaust.

2. The only Performance Guarantee made is that which is expressly stated in Paragraph 1A and 1B above. All other performance data contained in this Proposal or this Agreement or elsewhere are estimates or are for purposes of illustration only, and are not guaranteed.

3. The Performance Tests for determining whether the Performance Guarantee is satisfied shall be ineffective unless first reviewed and approved by us. We shall have the right and opportunity to witness the Performance Tests. In any event, the Performance Tests shall consist of simultaneous measurements of hydrocarbon VOC loadings at the inlet and discharge stack, and methane, ethane or other natural gas injection hydrocarbon contribution shall be deducted from the measurements at the discharge stack. Performance Tests shall be at your expense, except as provided in Paragraph 4 below, and if the Performance Tests for any unit of Equipment are not completed before the expiration of the Test Limitation Period for that unit, which shall expire 12 months from date of shipment, then that unit of Equipment shall be deemed to have satisfied the Performance Guarantee, and we shall have no further obligation under this Performance Guarantee as to that unit.

4. If any unit of Equipment does not satisfy the Performance Guarantee as determined by the Performance Tests, then we shall, at our option, either: (a) repair, replace, or modify such unit of Equipment until it satisfies the Performance Guarantee; or (b) pay you as liquidated damages in full satisfaction of all your claims arising out of failure to meet the Performance Guarantee, an amount equal to all payments made to us on this contract. If we elect to repair, replace, or modify such unit of Equipment, then the subsequent Performance Tests shall be administered at our expense (unless the failure was not caused by such unit of Equipment) until the Performance Guarantee is satisfied, at which time we shall have no further obligations under this Performance Guarantee as to that unit, and if after such repair, replacement, or modification the unit of Equipment fails to satisfy the Performance Guarantee, then we shall pay you liquidated damages per Clause (b) above. The remedies and obligations set forth in this Performance Guarantee are your exclusive remedies and our exclusive obligations in the event of failure of the Equipment to satisfy the Performance Guarantee.

5. ADWEST MAKES NO GUARANTEES ON ODOR REMOVAL WITHOUT SITE SPECIFIC PROCESS STREAM HYDROCARBON ANALYSIS AND COMPUTER MODELING.

SYSTEM ENERGY CALCULATION (Each RETOX 60.0RTO97 RTO)

These calculations are based on design process flow and VOC composition rates as provided by Schnitzer:

	NORMAL OPERATION	IDLE
Process Flow Rate, SCFM	60,000	15,000
Oxidizer Inlet Temp, ºF	105	70
Oxidizer Outlet Temp., ºF	150	120
Oxidation Temperature, ºF	1,500	1,500
VOC Rate, #/Hr. assumed	150	0
VOC Lower Heating Value, Btu/#	10,000	0
Energy Required, MMBTU/Hr	1.6	1.1
Energy Cost/Hr @ $ 5.00/MMBTU	$8.00	$5.50
Estimated System Fan Horsepower (scrubber clean)	295	11
Fan Energy Usage (scrubber clean), KW	239	9
Fan Energy Cost/Hr. @ $.09/KWH	$21.50	$0.79
Total Operating Costs, $/Hr	$29.50	$6.29
Estimated System Fan Horsepower (scrubber dirty)	365	15
Fan Energy Usage (scrubber dirty), KW	296	12
Fan Energy Cost/Hr. @ $.09/KWH	$26.62	$1.08
Total Operating Costs, $/Hr	$38.72	$7.37

NOTES:
1. *The above tabulation is for comparison purposes only and does not include casing heat losses.*
2. *For Air Quality permitting purposes, use a combustion chamber temperature of greater than 1500ºF.*
3. *Maximum process flow turndown is 4:1 without outside make up air*
4. *Startup burner firing rate is 15,895,000 BTU/ Hr. high fire for 90 minutes. NO_x during the burner high fire period is 30 ppm corrected to 3% oxygen.*

UTILITY REQUIREMENTS

Customer is to provide the following utilities for ach 60,000 scfm oxidizer system.

1. Natural gas 16,600 SCFH @ 5 PSI minimum per RTO at natural gas piping connection on oxidizer (cold start-up/high fire condition)
2. Electricity at 480 volt 3 phase 60 HZ, 80 Full Load Amps to each of two (2) RTO control panel disconnects
3. Clean/dry compressed air 720 CFH @ 90 PSIG per RTO at air piping connection on oxidizer
4. Dedicated Ethernet line to RTO control panels for VPN Modem.
5. Chemicals, water and caustic chemicals for scrubbers and associated liquid storage tanks.
6. Electric Power to scrubber recirculation and chemical feed pumps, immersion heaters (40 kw each) and associated freeze protection.

SCOPE OF SUPPLY

Type: Two (2) Model RETOX 60.0 RTO97 regenerative oxidizer systems with a nominal 97 percent thermal efficiency.

RETOX 60.0 RTO97 (Each Unit)

Weight: 239,300 pounds Plus Scrubber/Quencher

Dimensions: 59'-6" long plus process fan and Scrubber/Quench
26'-9" wide
12'-3" high

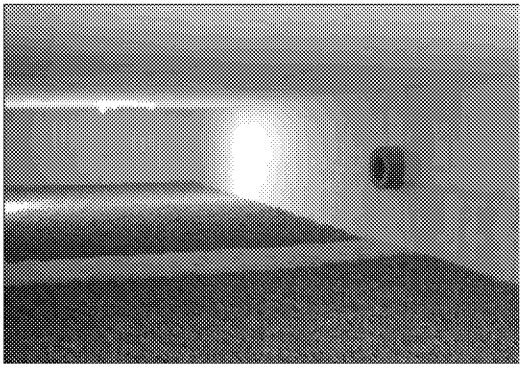
EQUIPMENT INCLUDED:

- Heat transfer media-Turbulent flow ceramic random packing-field installed by others
- Bed casing (Alloy Steel)
- Two 30" x 30" bed access doors (Alloy Steel)
- RTO Inlet and outlet plenums (Alloy Steel)
- Casing insulation-internally shop installed
- Nozzle mix natural gas burner with FM natural gas pipe train and combustion air blower (40 H.P.)
- Natural gas injection system (NGI) for Flameless Operation
- Two (2) process flow control valves with pneumatic operators (Alloy Steel)
- System controls including Allen Bradley programmable CompactLogix processor and PanelView Plus 7, 10" Color Screen
- Telemetry system with remote VPN diagnostics capability
- High temperature paint
- Electronic installation, operation, and maintenance instruction manual on thumb drive with troubleshooting, vendor literature, actual startup set up parameters & spare parts list
- Prewired RTO design with Cam-Lock quick connectors
- Compressed air surge tank with controls-one for each RTO
- Integral support skid
- UL stamped main control panel-shipped loose for indoor mounting by others
- Acid Gas Scrubber including integral quench, instrumentation, controls, and exhaust stack with EPA Test Ports

DESCRIPTION OF EQUIPMENT

Heat Transfer Media-97% Heat Transfer Recovery

Adwest's high temperature heat transfer media supplied will consist of turbulent flow silica/alumina random packing ceramic media, sized and selected to provide the most efficient heat recovery and pressure drops for this application. The media will be provided in adequate quantity to provide 97% TER. Ceramic media is field installed by others.



Bed Casing Insulation

The RTO bed casings are internally insulated with 6 inches at 10.6 Lbs. density of compressed ceramic fiber insulation (Carborundum or equal) rated at 2300ºF that is factory installed.

Bed Casing 3/16" Plate (Alloy Steel)

The bed casing design consists of all-welded construction, externally stiffened to withstand the pressure requirements of the forced draft fan and the lateral loads from the heat transfer surface making up the beds.

Inlet and Outlet Plenums 3/16" Plate (Alloy Steel)
The inlet and out plenums are designed to provide the most efficient flow distribution into and out of the porous bed and are constructed from externally stiffened carbon steel plates. The plenum walls do not require insulation for the LEL levels specified for this application.

Casing Access Openings 3/16" Plate (Alloy Steel)

The ceiling structure of the upper plenum is constructed such that access to the heat transfer media and burner is available to perform routine inspections.

Burner Assembly-MAXON LOW NOx

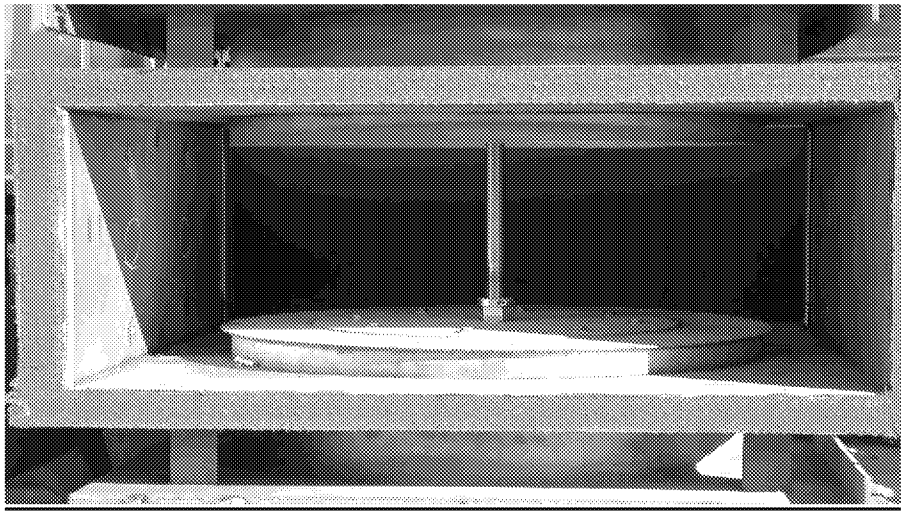
The burner is a Kinedizer LE low NO_x nozzle mix style by Maxon and is utilized only for unit start-up. An FM designed natural gas piping train is also provided.

Natural Gas Injection System (NGI)-flameless operation

A natural gas injection (NGI) system is utilized to allow the RETOX to be operated without the use of the main burner. This eliminates the need for combustion air and reduces the fuel consumption by more than 30%.

Two (2) Process Flow Control Poppet Valves (2205 Alloy Steel)

The oxidizer module contains two (2) vertical flow control poppet valves used to switch (regenerate) the direction of the process stream through the oxidizer and the two (2) chambers of ceramic heat transfer media. The valves are operated by two pneumatic actuators requiring clean, dry compressed air at 720 CFH, -40°F and 90 psig. If the air is not dry, freeze protection may be required and is not included. These valves are guaranteed for five (5) years (Requires annual Adwest Service PM visit), and do not require a purge air fan. They can be worked on and adjusted without cooling down the RTO.



System Controls and Instrumentation

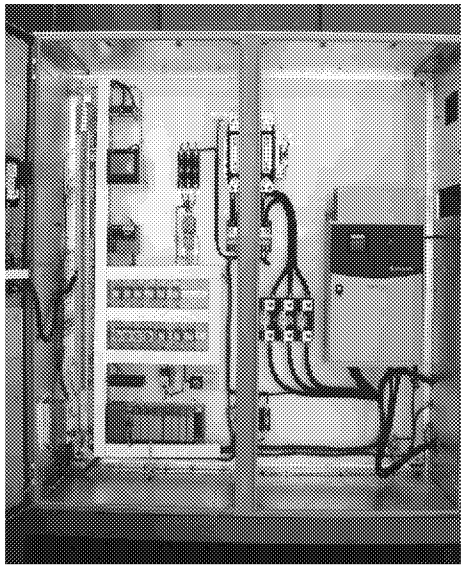
The main RTO and Scrubber control panels will be shipped loose (for mounting by others inside the facility control center) and are prewired, labeled, shop simulation tested, complete and ready for connections to plant power source and the RTO and scrubber system. Control panel not to be mounted in direct sunlight. The panels will be designed to NEMA 3R standards and suitable for indoor or outdoor installation. Each panel will contain the following:

Door mounted items

- Selection switches for mode of operation, off line bake out switch mode in HMI
- Allen Bradley PanelView 7 Plus Color 10" HMI Touchscreen display with tamper protected data man-machine interface.
- Selection push buttons for process blower, burner/start/stop and maintenance reset.
- Fault push-button

Internal mounted

- Main incoming 460v fused disconnect, 3-phase
- Honeywell flame safeguard
- Honeywell Burner management system
- Combustion air motor starter/disconnect
- Rockwell/Allen-Bradley Compact Logix (Ethernet) processor having telemetry capabilities via VPN access
- Panel heater and air conditioner
- Control power transformer (120v)
- VPN Ethernet Modem



Other items include flow diversion valves with solenoids, hand valve, filter, and regulator, for the compressed air piping train. Also included is a low compressed air pressure switch, proof of airflow differential pressure switch, high temperature limit switch mounted in the exhaust, and miscellaneous thermocouples. Controls of the thermal oxidizer shall be based on Adwest's standard design, programming and P & ID philosophy.

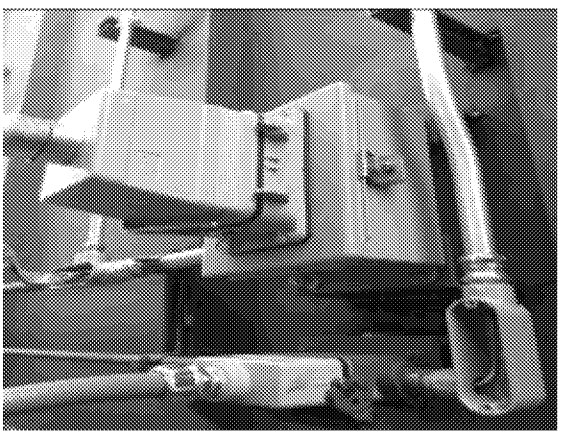
The Allen Bradley processor is supplied with a telemetry system, which allows the Adwest service department to remotely monitor the system operation. A dedicated Ethernet line to the control panel is required to enable Adwest personnel to communicate and remotely make program changes if required during start-up or future trouble shooting.

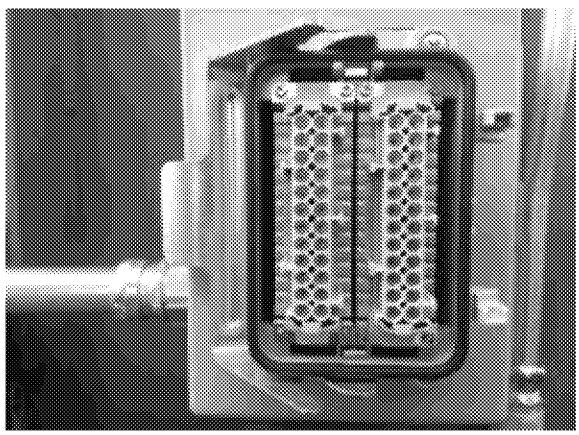
Paint

All exposed surfaces of the oxidizer will be coated with two (2) coats of our standard high temperature paint (black, brown, and gray). The stack will be manufactured from carbon steel.

RETOX RTO ILME Multi-pole Rectangular Connectors NEMA 4

Adwest provides our RTO clients with the highest level of electrical and mechanical shop assembly to provide rapid RTO installation time. Our larger RETOX RTO's utilize an ILME Multi-pole Rectangular Connectors "cam lock" quick connection to provide easy and secure electrical connections in the field.





Installation, Operation and Maintenance Instruction Manuals

The Adwest Technologies Technical Services Department will furnish electronic copy of the operation and maintenance instruction manual with vendor literature and recommended spare parts.

ACID GAS SCRUBBERS – MONROE ENVIRONMENTAL

Design Criteria

Monroe Multi-Stage Scrubbing System (2 Required)

Inlet Gas Flow Rate	96,000 ACFM @ 365°F (Maximum Temperature)
Gas Makeup	N_2, O_2, 4000 lb H_2O/hr, 1800 ppm_V CO_2
HCl Concentration	100 ppm_V
HF Concentration	10 ppm_V
Estimated HCl/HF Removal Efficiency	99%
Estimated NaOH Requirement	16 gph 25% Solution
Preliminary Blowdown Rate	***2 gpm***
Chemical Byproducts	NaCl, NaF, $NaHCO_3$, Na_2CO_3, NaOH
Estimated Evaporation	32 gpm
Estimated Water Requirement	***34 gpm***
Estimated Outlet Gas Flow Rate	73,000 ACFM @ 117°F, 100% RH
Vessel Construction	High Temperature FRP
Stack Construction	High Temperature FRP
Packing Material	Glass Filled Polypropylene
Piping/Valve Material	CPVC
Vessel Dimensions	12'-6" DIA x 40'-0" H
Stack Dimensions	***6'-0"*** DIA x 15'-0" H (55'-0" Overall System Height)
Packing Height	8'-0"
Recirculation Pump Motors	30 HP, 1725 RPM, 3/60/460, Chemical Duty

System Description

The Monroe Multi-Stage Scrubbing System is designed to efficiently remove airborne fumes present in the gas stream. Each system will consist of a single tower containing a quench section, packing section, spray headers, and a mist eliminator. An exhaust stack will flange mount to each scrubbing system exhaust flange. The scrubbing towers and stacks will each be connected to a mild steel support structure rated for a wind speed of 140 mph. Concrete pad design and anchor bolts are excluded.

The first stage of each system is a counter current quench section designed to cool the gas through evaporation to a temperature suitable for scrubbing. The quench section will provide approximately one second of retention time from the system inlet to the bottom of the packing section. A branch off the main recirculation line will feed approximately 100 gpm to the

quench section spray header. The packed section will provide a packing media height of 8 ft and will be wetted with a liquid feed rate of approximately 700 gpm.

The system will use sodium hydroxide (NaOH) to neutralize absorbed HCl and HF. The caustic feed will be controlled by a pH sensor and analyzer providing a 4-20 mA signal to the provided chemical feed pump. A conductivity sensor is provided to approximate the quantity of dissolved salts in the reservoir and control a relay to an electrically actuated ball valve on the recirculation line for system blowdown.

Each system will include redundant pumps and piping in order to maximize system running time. Along with the pH and conductivity instruments mentioned above, each system will include (2) liquid pressure gauges, (2) differential pressure indicating transmitters, (1) 4-pt liquid level switch, ***(1) single element thermocouple, (1) dual element thermocouple***, ***(1) low level switch, and (2) pressure switches*** for system monitoring. (2) 40 kW immersion heaters are provided for freeze protection of the liquid reservoir during system shut-down. (4) Heavy duty NEMA 4/4X 30 HP/60A disconnect switches for the pump motors and immersion heaters are included. Wiring from motors/heaters to disconnects is included.
24V and 120V instruments will be wired to a junction box. Motor starters, VFDs, PLCs, and controllers are excluded.

The proposed system will include necessary internal piping, fasteners, access doors, fill/drain connections, and other appurtenances required for correct operation. Some assembly, such as piping and instrument wiring, will be necessary in the field. Monroe factory-trained personnel will be provided to assist on-site with final assembly. Cranes, lifts, and other required equipment will not be provided by Monroe.
Pricing is for the currently approved Monroe Scrubber equipment, per submittal drawings 6967-01-A01-B, 6967-01-A02- C, 6967-01-A03-D, 6967-02-A03-C, 6967-01-A04-B, 6967-02-A04-B, 6967-01-E01-B, 6967-01-E02-B, 6967-01-E03-C, 6967-01-E04-A, 6967-01-E05-C, 6967-01-E06-C, and 6967-01-I01-D

Components and Features

Monroe Multi-Stage Scrubbing System	
FRP Vessel	- 12'-6" DIA x 40'-0" H - 60" x 96" flanged inlet connection - Quench section spray header and nozzles - High efficiency packing media with supports - Packed tower spray header and nozzles - Pipe supports - Flanged access doors – spray headers, packing, mist eliminator, reservoir - *72" Diameter* flanged outlet connection - Class 150 flanged liquid connections - Lifting and mounting lugs - Single stage PP mesh mist eliminator with support and hold-down members
Exhaust Stack	- 6'-0" DIA x 15'-0" H - (2) 2" Class 150 flanged connections spaced 90° for stack testing

Exterior Support Structure	- Coated mild steel construction - Tower and stack will bolt to structure - Designed for Wind Risk Category III-IV: 140 mph - Includes support beams, cross bracing, and fasteners - Access platforms and ladders currently not included
Piping	- Schedule 80 CPVC pipe - Schedule 80 PVDF pipe (quench spray headers) - Class 150 flanges - Manual butterfly valves for pump isolation - (2) Electrically actuated ball valves – blowdown and water makeup - *(2) 8" CPVC check valves*
Recirculation Pumps	- CPVC wetted construction - Centrifugal, horizontal - Up to 800 gpm @ 67 ft. TDH - 30 HP, 1725 RPM, 3/60/460V, chemical duty motor - (2) Pumps, (1) operating and (1) standby - Mounted next to scrubber reservoir - (2) NEMA 4/4X enclosed disconnect switches
Chemical Feed Pump	- Polypropylene liquid end construction - Electric diaphragm pump - Up to 21 gph - Shipped loose for mounting near chemical storage tank
Immersion Heaters	- Flange mounted - Inconel construction - (2) Included, rated for 40 kW each - (2) NEMA 4/4X Enclosed Disconnect Switches
Instrumentation	- (2) Differential pressure gauge/transmitter, 4-20 mA - (2) Pressure gauge - (1) 4-pt. level switch, CPVC floats - (1) Single element thermocouple w/thermowell - *(1) Dual element thermocouple w/thermowell* - (1) pH electrode with 50 ft cable and quick disconnect connector - (1) Conductivity cell with 50 ft cable and quick disconnect connector - (1) NEMA 4X pH/conductivity analyzer with (2) analog 4-20 mA outputs and (2) electromechanical 120V relay outputs – panel mount - (1) Low level float switch - (2) Pressure switch
Included On-Site Assistance	- Up to (10) days on-site by Monroe personnel - Technical assistance and supervision of erection and assembly of scrubber and support structure

OPTIONS

ACID GAS SCRUBBERS – HEE DUALL

Design Criteria

HEE DUAL Multi-Stage Scrubbing System (2 Required)	
Inlet Gas Flow Rate	96,000 ACFM @ 365°F (Maximum Temperature)
Gas Makeup	N_2, O_2, 4000 lb H_2O/hr, 1800 ppm_V CO_2
HCl Concentration	100 ppm_V
HF Concentration	10 ppm_V
Estimated HCl/HF Removal Efficiency	99%
Estimated NaOH Requirement	16 gph 25% Solution
Preliminary Blowdown Rate	1 gpm
Chemical Byproducts	NaCl, NaF, $NaHCO_3$, Na_2CO_3, NaOH
Estimated Evaporation	32 gpm
Estimated Water Requirement	33 gpm
Estimated Outlet Gas Flow Rate	73,000 ACFM @ 117°F, 100% RH
Vessel Construction	High Temperature FRP
Stack Construction	High Temperature FRP
Packing Material	Glass Filled Polypropylene
Piping/Valve Material	CPVC
Vessel Dimensions	12'-6" DIA x 40'-0" H
Stack Dimensions	5'-6" DIA x 15'-0" H (55'-0" Overall Height)
Packing Height	8'-0"
Recirculation Pump Motors	30 HP, 1725 RPM, 3/60/460, Chemical Duty

Note: HEE-Duall has quoted a "like-for-like" scrubber spec to Monroe, but ascertains that there are design efficiencies that can be applied to improve the system and lower cost.

HEE-Duall Scrubber System Description

The Multi-Stage Scrubbing System is designed to efficiently remove airborne fumes present in the gas stream. Each system will consist of a single tower containing a quench section, packing section, spray headers, and a mist eliminator. An exhaust stack will flange mount to each scrubbing system exhaust flange. The scrubbing towers and stacks will each be connected to a mild steel support structure rated for a wind speed of 140 mph. Concrete pad design and anchor bolts are excluded.

The first stage of each system is a counter current quench section designed to cool the gas through evaporation to a temperature suitable for scrubbing. The quench section will provide approximately one second of retention time from the system inlet to the bottom of the packing section. A branch off the main recirculation line will feed approximately 100 gpm to the quench section spray header. The packed section will provide a packing media height of 8 ft and will be wetted with a liquid feed rate of approximately 700 gpm.

The system will use sodium hydroxide (NaOH) to neutralize absorbed HCl and HF. The caustic feed will be controlled by a pH sensor and analyzer providing a 4-20 mA signal to the provided chemical feed pump. A conductivity sensor is provided to approximate the quantity of dissolved salts in the reservoir and control a relay to an electrically actuated ball valve on the recirculation line for system blow down.

The system will include redundant pumps and piping in order to maximize system running time. Along with the pH and conductivity instruments mentioned above, the system will include (2) liquid pressure gauges, (2) differential pressure indicating transmitters, (1) 4-pt liquid level switch, and (2) thermocouples/temperature transmitters for system monitoring. (2) 40 kW immersion heaters are provided for freeze protection of the liquid reservoir during system shut-down. (4) Heavy duty NEMA 4/4X 30 HP/60A disconnect switches for the pump motors and immersion heaters are included. Wiring from motors/heaters to disconnects is included. 24V and 120V instruments will be wired to a junction box. Motor starters, VFDs, PLCs, and controllers are excluded.

The proposed system will include necessary internal piping, fasteners, access doors, fill/drain connections, and other appurtenances required for correct operation. Some assembly, such as piping and instrument wiring, will be necessary in the field and cranes, lifts and rigging is by others.

Scrubber Components and Features

FRP Vessel

- 12'-6" DIA x 40'-0" H
- 60" x 96" Flanged Inlet Connection (Preliminary)
- Quench Section Spray Header and Nozzles
- High Efficiency Packing Media with Supports
- Packed Tower Spray Header and Nozzles
- Pipe Supports
- Flanged Access Doors
- Spray Headers, Packing
- Mist Eliminator 66" Diameter Flanged Outlet Connection - Class 150 Flanged Liquid Connections
- Lifting and Mounting Lugs
- Single stage PP mesh mist eliminator with support and hold-down members

Exhaust Stack

- 5'-6" DIA x 15'-0" H
- (2) 2" Class 150 Flanged Connections Spaced 90° for Stack Testing

Exterior Support Structure

- Coated mild steel construction
- Tower and stack will bolt to structure
- Designed for Wind Risk Category III-IV: 140 mph
- Includes support beams, cross bracing, and fasteners
- Access platforms and ladders currently not included

Piping

- Schedule 80 CPVC Pipe
- Class 150 Flanges
- Manual Butterfly Valves for Pump Isolation
- (2) Electrically Actuated Ball Valves – Blow down and Water Makeup

Recirculation Pumps

- CPVC Wetted Construction
- Centrifugal, Horizontal
- Up to 800 gpm @ 67 ft. TDH
- 30 HP, 1725 RPM, 3/60/460V, Chemical Duty Motor
- (2) Pumps Included, (1) Operating and (1) Standby
- Mounted next to Scrubber Reservoir
- (2) NEMA 4/4X Enclosed Disconnect Switches

Scrubber Exclusions and Clarifications

On-Site Assistance

- Includes up to (10) days on-site by scrubber personnel - Includes technical assistance and supervision of erection and assembly of scrubber and support structure
- Excludes all mechanical labor, tools, parts, and equipment
- Freight – Shipping width will exceed 12 ft. Special considerations will need to be made to determine what equipment, permits, and pilot vehicles are required.
- Excludes Access Ladders/Platforms
- Excludes Stack Testing
- Excludes Heat Trace, Insulation
- Excludes Motor Starters, PLCs, VFDs, Controllers

Note: The selected high temperature resin is rated for continuous duty operation at a maximum temperature of 300°F. Intermittent/infrequent temperature spikes to a maximum of 365°F can be tolerated; however excessive spikes or prolonged operation above 300°F may compromise resin and vessel integrity.

SCOPE OF SUPPLY BY OTHERS

The Following Work is Not Included in Adwest's Scope Of Supply and is by others:

1. Labor, materials and equipment to mechanically and electrically install the proposed two (2) RETOX RTO 60.0RTO97 Thermal Oxidizers, duct from the oxidizer outlet to the scrubber inlet, and Scrubbers/Quenchers, including:

    - Support steel and access/testing ladders/stairs and platforms
    - Control panels and wiring
    - Concrete foundations and/or steel support platforms for proposed RETOX 60.0 RTO97 Thermal Oxidizers and scrubbers
    - Mounting bolts and plates

2. Supply and installation of:

    - Chemical storage tanks, spill control and interconnecting piping
    - Water, chemicals and caustic for scrubbers along with associated water/chemical caustic feed lines, pumps, storage and drain provisions.
    - Process ducts and ducts from fans to RTO inlet connections
    - System fans, VFDs and local disconnects
    - Provisions for make-up air to RTOs with process isolation dampers
    - Required exterior insulation and cladding on all ductwork.
    - Required compressed air supply systems

3. Power supply of 460 volt, 60 cycle, three-phase and 120v, 60 cycle, single phase electric and any required electrical disconnects and shutoffs and surge protection. Electric power and disconnects for scrubber recirculation and chemical feed pumps, immersion heaters (40kw each) and freeze protection.

4. Provisions for obtaining FM, CSA, TSSA, IRI, OSHA, NEC, NFPA, Mass Gas Piping, City Drain or sewage, or other required approvals and inspections.

5. Natural gas at 5 Psig and clean dry compressed air at 90 Psig. Desiccant dryers for clean dry compressed air. Water and chemical feed supply and isolation valves for scrubbers and scrubber water drains and pumps.

6. All city, local, county, state and EPA, operator, building, air, inspection permits, inspections and associated costs.

7. UL approval and inspections of oxidizer if required. PE Stamps and inspections and associated fees if required.

8. Sales Tax, duties, personal, local, state, federal and corporate income taxes, etc. on project.

9. Air Board Compliance testing by third party. Adwest to approve RTO and scrubber test methods and protocols and Adwest to have option to witness the RTO stack test.

10. Utilities brought to and terminated at the RTO and scrubber connection points including water, natural gas, electric, compressed air, caustic, and Ethernet connections with required utility shutoffs and disconnects.

11. Gas fired ovens, dryers, etc. must have separate purge fans and atmospheric dampers to comply with NFPA codes.

12. Our steel supply is designed for our equipment loadings only. No external loads are to be applied.

13. Personnel protection, security fencing, lighting and convenience outlets.

14. Freight (billed at actual cost to client plus 10%).

15. All other items and services not specifically included by Adwest scope of supply.

16. Pre-filtration of an particulates prior to entering the proposed RETOX RTO.

17. Please advise if RETOX RTOs and Scrubbers are to be located in a Class 1, DIV 2 classified area which requires additional cost.